Overview of Duke ITk activities

Penn ITk meeting

May 2016

Mark Kruse

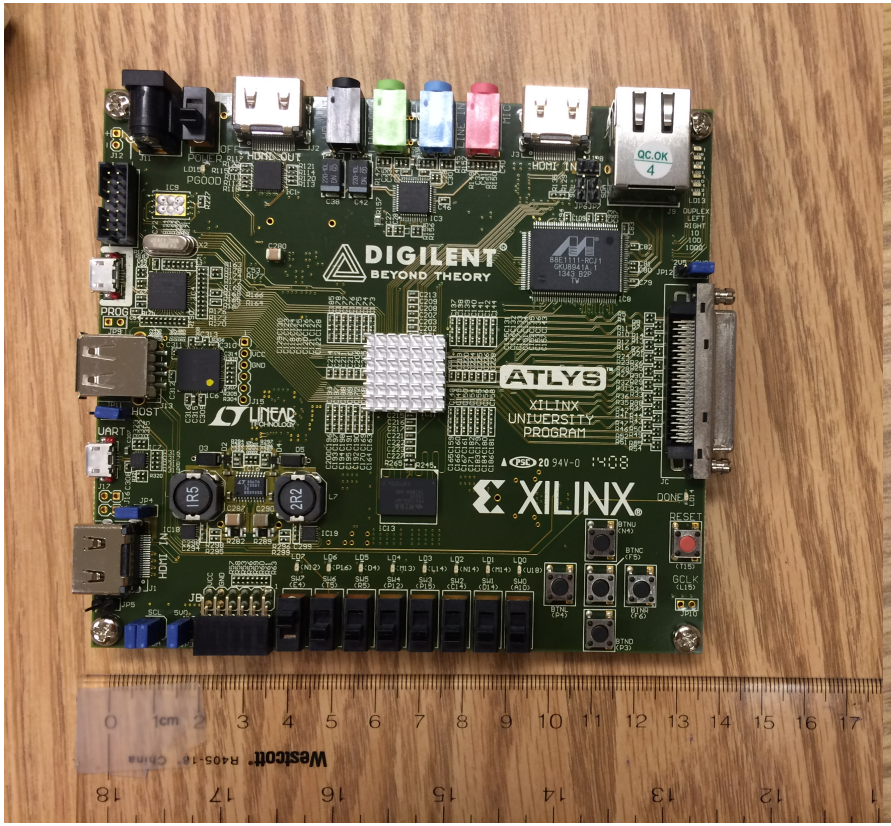
Duke ITK Personnel and Funding

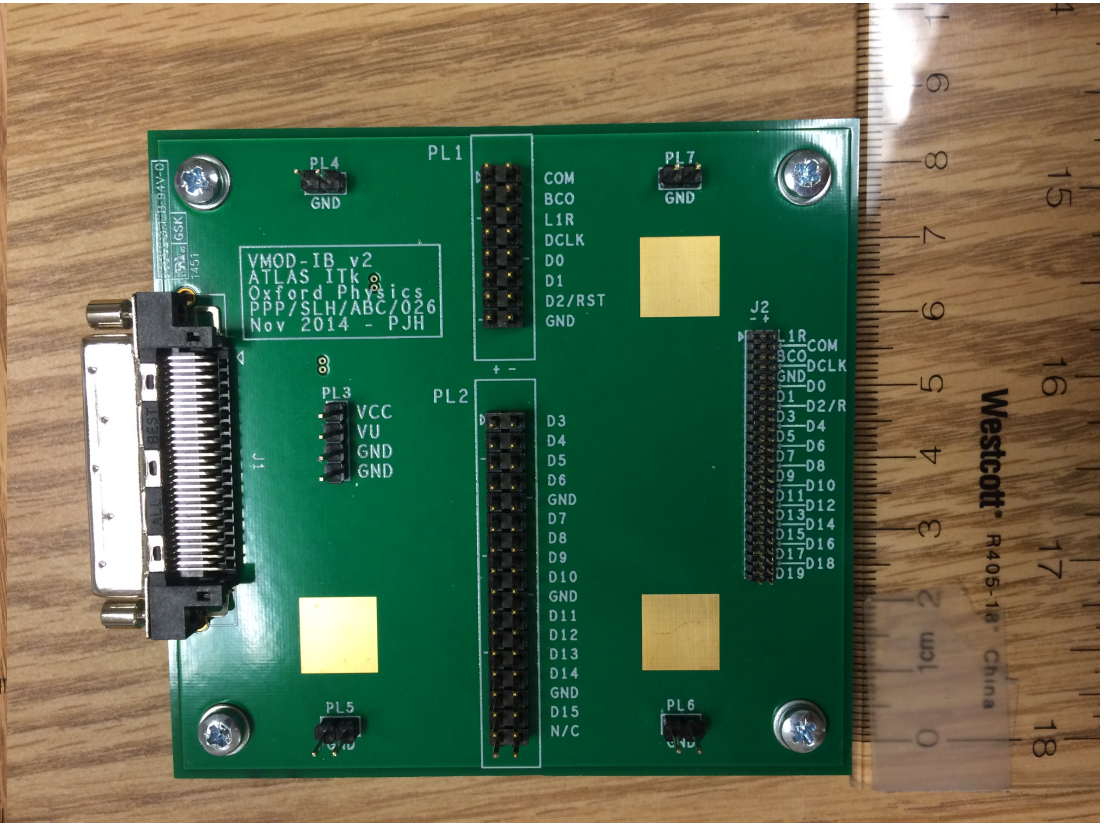
- **Faculty**: Ayana Arce, Mark Kruse
- **Technical support:** Brogan Thomas (0.8 FTE) – funded by USATLAS
- **Postdocs:** none
- **Grad students:**
  - Ping Zhao (50%, current qualification task)
  - Chen Zhou (graduating next week!)
- **Undergrads:** ~4 during the summer

- Main ITk role: develop standardised module testing infrastructure, DAQ procedures (FPGA firmware, software). Will be conducting various module stress tests during (pre)production and possibly repairs as needed.

HSIO → Atlys

- Ping is working mostly Peter Phillips and Matt Warren (UK) – his technical supervisors for his qualification task.

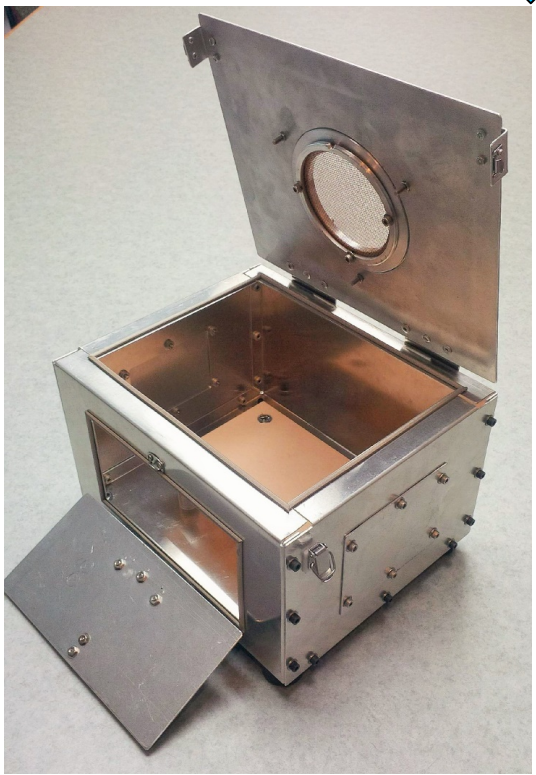


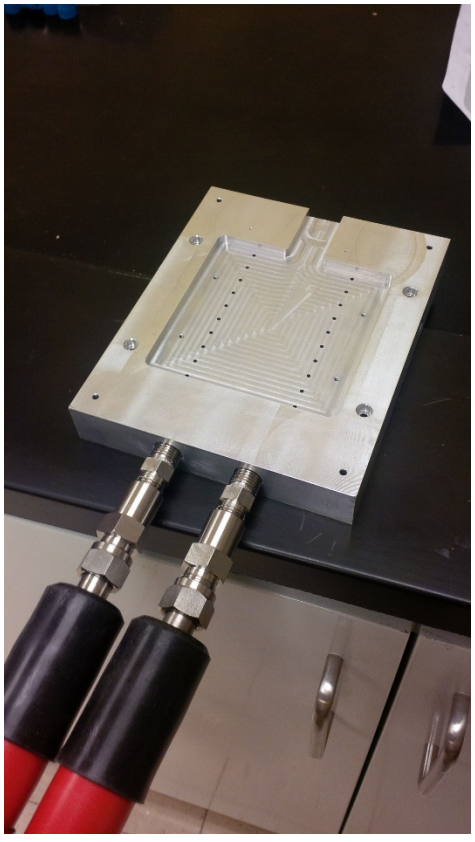


- We have successfully gotten this to work with a ABCn250 chip (Ping becoming VHDL expert)
- Will need ABCn130 test parts

Module testing infrastructure

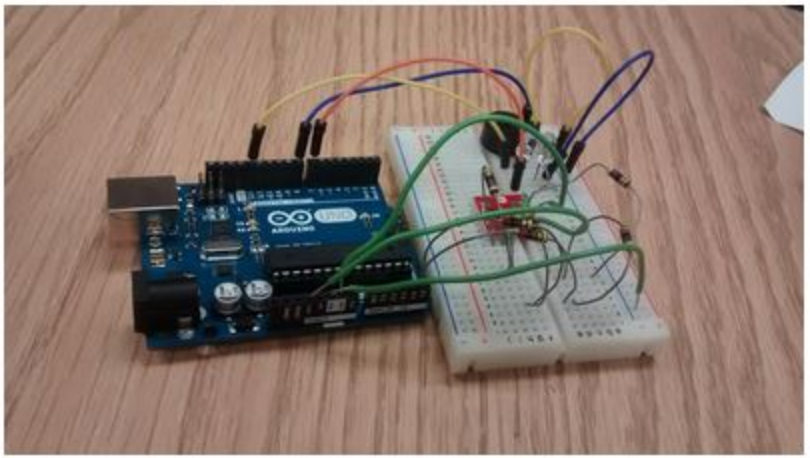
- Developing a “standardized” module testing setup
  - Cooling system (want capability down to -40C): Huber CC-505 chiller best suits needs
  - Humidity control: installed dessicant air dryer
  - Developed interlock system to interlock on humidity and/or temperature
  - Cooling block machined at Duke
  - Module enclosure designed and built at Duke

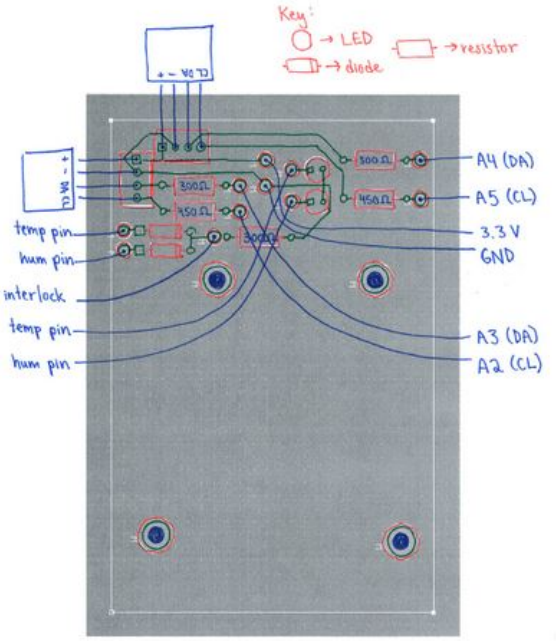




Module testing interlock system

- Modules are valuable – need to interlock on temp and perhaps humidity
- Undergrad project
- We have developed a simple Arduino based temperature and humidity monitoring system that can shut down module power when preset thresholds reached
- Requires PS with external input for interlocking





- Have had PCB's printed and now putting it all together from bread-board model
- Undergrads this summer will test capabilities of chiller and humidity control systems using this interlock system

Duke facilities

- **Duke Physics machine shop**
  - Has been invaluable for machining of infrastructure parts and general contribution to the project as needed
- Possibility for B field stress tests at Duke
- We have access to the Duke SMIF (Machine and Instrumentation facility) which has a semi-automatic wirebonder, probe station, clean room (at any desired level) – however, probably only useful for repairs as/if needed
- We are considering adding clean-room specs to our present lab

Additional points

- We will play a direct role in testing modules – in particular, various stress tests and perhaps burning-in in coordination with the labs, in addition to training personnel who can relocate to an ASC (for us at BNL and/or ANL)
- We have also done thermal simulations of the module (not shown here) to understand the areas most likely to be stressed

- We need to address our lack of postdoc presence on the project at Duke